

**DRAFT**

**U.S. DEPARTMENT OF COMMERCE**

**National Oceanic and Atmospheric Administration**

**National Weather Service**

# **Year 2000 Program Plan**

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Acting Director, National Weather Service

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## **I. IDENTIFICATION SECTION**

This plan describes the activities the National Weather Service (NWS), will undertake to resolve the challenges presented by the coming century change. NWS consists of five Line Offices and a number of staff and program offices. Appendix A contains the NWS Organization Chart. The NWS Year 2000 activity has been assigned to the NWS Office of Management and Budget, Information Systems Section (W/MB33). The MB33 Y2K Program Management team consists of Barbara Brenkworth, Chief, Information Systems Section, and Mark Rew. They can be reached at (301) 713-0262. Address email to:

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## **II. INTRODUCTION**

This plan describes how the National Weather Services will address the issues associated with the transition to the next century - the Year 2000 Problem. This plan sets forth the schedule for all tasks and phases of the Year 2000 program. As we complete more of the Year 2000 activities the plan will be updated to include master conversion and replacement schedules, assignment of conversion or replacement projects to Year 2000 teams, risk assessment, and identification of contingency plans as identified.

### **A. Background**

The National Weather Services of the 21<sup>st</sup> Century will operate one of the most advanced hydrometeorological warning and forecast systems in the world. Advances in meteorology and hydrology as well as in the technology for observing and analyzing the atmosphere already are providing unprecedented improvements in weather services. It is important to the NWS that the Year 2000 represent a smooth transition to the 21<sup>st</sup> Century.

The mission of the National Weather Service is

To provide weather and flood warnings, public forecasts and advisories for all of the United States, its territories, adjacent waters and ocean areas, primarily for the protection of life and property. NWS data and products are provided to private meteorologists for the provision of specialized services.

To achieve this mission, the NWS will continue to:

- coordinate programs with state, local and federal agencies involved with meteorological and hydrology to attain maximum cost effectiveness

- provide a spectrum of weather and hydrologic services to the private hydrometeorological community
- provide data and products to the private sector and encourage growth of the private weather industry
- work closely with the mass media as a chief means of communicating weather and flood warnings and forecasts to the public
- fulfill international hydrometeorological obligations
- Conduct applied research with other agencies and the scientific community to improve warnings and forecasts based upon scientific and technological advances
- enhance dissemination and information exchange service
- facilitate improvements in emergency management decision process

The NWS has been aware of, and addressing, the Year 2000 problem since the early 1980's in order to ensure that the mission of the organization is not compromised. Fortunately, through modernization efforts currently underway, a great deal of Year 2000 issues will be addressed through the normal life cycle.

There remains a number of legacy systems and challenges that will require a concerted effort on the behalf of NWS employees to ensure that the organization is not adversely impacted by Year 2000 issues.

The NWS has identified eight (8) mission critical systems for the purpose of Year 2000 with the following Y2K Status:

#### REPAIR

National Centers for Environment Prediction  
National Weather Service Telecommunications Gateway  
National Weather Service River Forecast System

#### REPLACE

AFOS  
Upper Air

#### DEVELOP-Y2K

AWIPS  
NEXRAD  
ASOS

In addition to these missions critical systems, each line office has identified non-mission critical information systems which will be evaluated for Year 2000 Compliance.

This program plan defines the overall strategy that the NWS has adopted for implementing the phases and associated tasks as defined by the GAO Year 2000 Computing Crisis: An Assessment Guide to ensure that we are ready to face the new millennium.

## **B. NWS Year 2000 Program Plan - Strategy**

NWS has implemented a decentralized approach for managing Y2K activities. Each NWS Line Office and Mission Critical System Team is responsible for planning and implementing detailed action plans to resolve their respective Year 2000 issues. The NWS will report progress toward resolving the Year 2000 issues through the existing NOAA Operating Plan Quarterly Review process.

## **III. AWARENESS PHASE**

Awareness activities will be on-going throughout the life cycle of the Year 2000 project. There is a continuing need to ensure that everyone knows of the Year 2000 problem, how to correctly resolve Year 2000 problems or prevent them from occurring, and what actions NWS and their components are taking in regards to the problem.

Many of the NWS Y2K initiatives started several years ago. In 1989, the NWS migrated its administrative applications to the Oracle RDBMS environment and, at that time, converted our tables to a four-digit date format for "as of dates" and "fiscal year" identifiers. In addition, NWS wrote into its IRM plan for the 5 years from 1992 to 1997, a requirement that IT contracts be Y2K compliant. During this same time period, before 1992, strategic plans were developed to migrate from IBM operating systems to UNIX-based systems, factoring in Y2K compliant capability. In 1994, our Office of Systems Operations began storing all of their 5-year archive tapes as four-digit years.

### Current Status:

The NWS has completed initial steps in its Awareness Phase by:

- contacting all NWS focal points directly,
- publishing articles in NWS-wide publications,
- NCEP publishing separate articles relating to the unique issues of the Centers,
- NCEP supercomputers providing a daily countdown to year 2000
- Distributing Y2K-recommended contract language to appropriate purchasers.

Awareness Phase activities which will be on-going include:

- continued development of vendor compliance lists
- Y2K information dissemination - Web Pages, etc.
- publishing articles on Y2K compliance issues
- publishing Y2K status reports

#### **IV. ASSESSMENT PHASE**

The Assessment Phase deals with those activities required to determine the size and scope of the Y2K problem and to set up the internal process necessary to solve it. Information about the size and scope of the Year 2000 Problem is necessary to make reasonably accurate estimates of the correction cost in terms of dollars and work years. The major issues to be encountered during this phase will be concerned with either source code or budgeting and scheduling. The primary deliverable from this phase is the NWS project plan.

##### Current Status:

- Assembled Y2K Mission Critical System Teams
- Identified all other systems and core business areas
- Completed comprehensive system inventories
- Project NWS mission critical and non-mission critical compliance efforts cost and FTE requirements
- Developed system specific impact statements
- Developed overall NWS impact statement
- Identified NWS-specific issues related to date formats
- Defined “consensus” opinions for some conversion options
- Developing automated system profile
- Prepare NOAA and DOC quarterly reports
- Developed the NWS Project Plan

#### **V. RENOVATION PHASE**

The renovation phase involves making and documenting software and hardware changes, developing replacement systems, and decommissioning eliminated systems. Renovation involves the conversion of an existing application, replacement deals with the development of a new application, and elimination focuses on the retirement or decommissioning of an existing application or system component. The process requires an evaluation of the inter-dependencies among applications, hardware platforms, databases, and the internal and external interfaces.

##### Current Status:

- Began identification of internal and external date exchange interfaces
- Identified consensus approaches for implementing changes to key meteorological products
- Developed implementation plans for ensuring that the enterprise electronic mail system is Year 2000 compliant

### Milestones:

Distribute renovation phase checklist to Teams/Focal Points	10/5/97
Identify methodology for documenting code/system changes	11/3/97
Identify requirements for communicating changes to customers	12/1/97
Teams develop detail conversion schedules	1/1/98
Develop Master COTS Upgrade Schedule	1/1/98
Teams develop system test schedules	3/1/98
Implement Master COTS Upgrade Schedule	3/1/98
Implement system Test Schedule	3/1/98
Validate teams have completed renovation phase activities	1/1/99
Update management on progress	1/1/99

## **VI. VALIDATION PHASE**

All converted or replaced system components must be thoroughly validated and tested to uncover errors introduced during the renovation phase, validate year 2000 compliance, and verify operational readiness. The testing should account for application, database interdependencies, and interfaces. The testing must take place in a realistic test environment. Testing procedures must be assessed to ensure that converted system components meet quality standards and are Year 2000 compliant.

### Current Status:

- Identify appropriate test environments, where possible
- Identify test tools and scripts, where possible
- Defining test metrics to manage the test and validation process

### Milestones:

See Implementation Phase

## **VII. IMPLEMENTATION PHASE**

Implementation of the Year 2000 compliant systems and their components requires extensive integration and acceptance testing to ensure that all converted or replaced system components perform adequately. The reintegration of the year 2000 compliant applications and components into the agency's production environment must be carefully co-ordinated to account for system interdependencies. Parallel processing may be need to reduce risk.

### Current Status:

Milestones:

Distribute validation and implementation phase checklist	12/1/98
Teams define transition environment & procedures	1/1/99
Teams develop individual implementation schedules	1/1/99
Report and address data exchange issues and interagency concerns	1/1/99
Implement converted or replaced systems	2/1/99
Begin formal acceptance testing	3/1/99
Implement contingency plans - where necessary	6/1/99
Update disaster recovery plans - as required	6/1/99
Conduct pre-close Y2k briefing - identify critical items, if any	6/1/99
Complete final system testing	9/1/99
Conduct closing Y2k Briefing	11/1/99



## Appendix A - Master Schedule

Appendix B  
NWS Y2K Mission Critical System  
Team Assignments

NWS Telecommunication Gateway:

Team Leader: Mel Gasper, (713-0864 x135)  
Team Members: Jim Fenix  
Dan Starosta  
Lloyd Irvin

AFOS:

Team Leader: Mel Gasper (713-0864 x135)  
Team Members: Gerry Griffin  
Janet Soslow  
Larry France  
Robert Beasley

ASOS:

Team Leader: Rich Bunevitch (713-0864 x135)  
Team Members: Viha Nguyen  
Rick Parry

Upper Air:

Team Leader: Eddie Roberts (713-0722 x164)  
Team Members: Don Johnson  
Jim Fitzgibbon

NEXRAD:

Team Leader: Bill Haden (405-366-6500 x2250)  
Team Members: Bill Armstrong  
Greg Cate  
Russ Cook  
Scott Enders  
Mike Istok  
Mike Bender  
Randy Racer

AWIPS

Team Leader: Sandra Hoexter NOAA/AAO  
Team Members: Harry Glahn, NWS/TDL  
Ward Seguin, NWS/OSD

George Smith, NWS/OH  
Mike Biere, NWS/FSL  
Alan Miley, PRC

## NWSRFS

Team Leader: Sarah Roy  
Donna Page

## NCEP

Team Leader: Arthur Wick, NCO 301-763-8000, ext. 7155

Team Members: Dick Lehman, NCO  
Luis Cano, NCO  
John Ward, NCO  
Joe Irwin, NCO  
Dave Plummer, NCO  
Joe Johnson, NCO  
Avis Spruill, NCO  
Jeff Langley, NCO  
Mark Iredell, EMC  
Dennis Keyser, EMC  
Bob Bermowitz, CPC  
Phillip Bothwell, SPC  
Tim Mahony, AWC  
Mark DeMaria, TPC  
Greg Grosshans, SPC  
Ed Danaher, HPC  
Mark Waters, MPC

Appendix C  
NWS Y2k Assessment  
Mission Critical and Core Business Impact Statements

**NWS Training Center - NWS TC**  
**No Y2K Impact**

The TC has two classes of computers currently in use.

1. Class 1 would be systems such as AWIPS, NEXRAD, AFOS, etc. These NWS operational systems are under the Configuration Management of NWS Headquarters who would be the primary contact for questions concerning Y2K problems concerning them.
2. Class 2 would be the OTS systems acquired by the Training Center for either training demonstration/laboratory use OR for use in the production, administration, delivery of training materials. These PCs/workstations/lans are updated (HW/OS/apps) regularly for a number of reasons and as such do not have HW/OS/apps that are a Y2K problem.

**Office of Meteorology**  
**No Y2k Impact**

The Office of Meteorology does not have responsibility for any operational NWS systems and does not anticipate any Y2K impact.

**Office of Assistant Administrator**  
**No Operational Y2K Impact - LOW RISK**

The Office of Assistant Administrator manages the local and wide area network activities of the National Weather Service and has determined that the file servers and devices which support network communications are already Y2K compliant, or will be through normal system upgrades well before the Year 2000.

AA also supports some applications which provide the underlying infrastructure for some budgeting and management functions. The majority of these applications are in Oracle, which is Y2K compliant. Some in-house developed software exists which is currently being reviewed but we do not anticipate that Y2K compliant issues will surface.

**NEXRAD**  
**No Operational Y2K Impact - LOW RISK**

## 1. Software

The NEXRAD WSR-88D applications software and utilities have been tested and the results have been reviewed and no problems were seen in the online/operational software. However, one module of a utility function (which is seldom employed and operates in an offline environment) will require modification. This is anticipated to require 80 hours of effort. Further, NEXRAD system interface control documents (ICDs) were reviewed for possible impact to users and our finding was that a Julian date format is frequently used; this should present no problems as this is computed with reference to 1970 and the representation capacity should be capable of properly handling the date-time until the 2030-2040 time-frame. In some cases, such as the Principal User External System (PUES) interface, it was noted that two digit representation is employed; this two digit field is properly computed from the Julian date for all cases (before, during, and after the year 2000). It should also be noted that the two digit conversion is required to satisfy the "red book" format that is used for the ICD. Archived data was also reviewed and the recorded data is date and time stamped using the Julian date approach. Playback of the archived data requires the operator to enter a date and time, and this is converted to Julian format and was found to execute properly.

## 2. Hardware:

There are no known issues with the hardware and none surfaced during Y2K testing. One potential concern was the BGL real-time clock which is a third party device purchased for the NEXRAD program. It was determined that the BGL clock will function until the year 2083.

The Information Systems Section has gathered the following information concerning the Open Systems Project and the commercial hardware and software used at the OSF:

1. The Open RPG system, currently under development, has not demonstrated any problems nor are any anticipated based on the following findings:
  - a. ORPG software developers are well aware of the Year 2000 issue. All of the ORPG software being developed will be Year 2000 compliant.
  - b. Development is being done with the Unix Operating System. Unix handles time as a signed 32-bit integer in seconds since 00:00:00, 1/1/70. An overflow problem will not occur until the year 2038. This issue will be prevented when Unix moves to an integer word size greater than 32-bits. Further, the commercial Unix systems being used are advertised as being Year 2000 compliant.
  - c. Year 2000 test procedures are being incorporated into the ORPG Software Test Description document.

### **Office of Systems Development Minimal Y2K Impact - Low Risk**

OSD is responsible for no operational systems, except for PCs for receipt of cc:mail. All PCs will be Y2K compliant by 2000. OSD does write software for systems operated by other

organizations. Activities in those areas are covered under the reports for those systems (e.g., AWIPS). If the software written by OSD did not perform properly, messages would not be received and processed properly and the production of warnings and forecasts might be impacted.

This impact is being mitigated by code analysis and testing of all date processing portions of the software.

### **NWS Regions - Consolidated Impact Statement**

#### **Minimal Y2K Impact - Low Risk**

NWS weather forecast offices and other supporting weather stations are separated into six regions throughout the Country. Regional headquarters offices develop and manage the regional operations policies for field offices. These regions rely on National systems for such operations as observations, forecasting, and reporting. The majority of the regional Y2K compliant issues are being address by the mission critical teams.

The regions are responsible for the following areas for Y2K compliance.

Local workstations, networks, and PCs. All PCs and network servers should be fully tested for compliance. This includes any local telecommunication equipment.

IMPACT: Telecommunications equipment can impact the field office function if it prevents other mission critical systems from operating. PCs and other office automation equipment needs to be tested to insure compliance, because a failure could result in costly work delays and down time.

COTS Software. The regions are responsible for all commercial software they purchase.

IMPACT: Software failure would effect office automation and support for mission critical systems.

In-house developed software. Any specialized software developed or implemented by the region will need to be tested and evaluated for Y2K compliance.

IMPACT: In-house routines which interface directly with national systems and/or facilitate the development of forecasts or warnings which are not Y2K compatible and are not repaired could conceivably cause a disruption in the day-to-day mission of a forecast office. Specialized financial and personnel applications can impact the regional headquarter's ability to perform administrative functions such as the proper payment of shift employees or timely payment of invoices.

Non-informational systems, such as facilities. There are several types of non-informational technologies that can impact a regional offices ability to function or possibly conduct mission

critical activities. These technologies include phone and voice communications, building safety with fire alarms, elevators, and automated security such as picture identification locks.

Specific impact statements, where available:

Southern: All systems that apply, are national systems or systems that will be replaced by AWIPS. If AWIPS stays on schedule, we will not have any problems. Our LANs and WAN will be okay. All our regional programs have been upgraded to Windows 95 and Windows NT. These handle the Y2K problem already. Our major concerns are over nationally supported legacy systems that may remain if AWIPS slips. AFOS will not accept 2000 as a valid date. The major scheduling software (Watchdog) will not accept 1999.

Alaska: All software would be manually inspected in the Alaska Region. All of the office automation software is "off-the-shelf" packages and could not be "decoded" for inspection. Inspection would be made by running programs used everyday by inputting the year 2000. However, depending on the software, this test may not be 100% accurate.

Pacific: We see no large problems with the "year 2000" issue here because nearly all of the programs used are off-the-shelf commercial items or "national" programs that are not maintained by PR staff. We have to make the basic assumption that all commercial programs will be totally upgradeable to a version that will correct any "year 2000" problems. This may be a dollar expense but the only impact on PR staff will be the time required to purchase the necessary new versions and time and travel to install them. Our existing databases will either work as is under the new versions or they will be properly "converted" by the new version. The same assumption holds for "national" programs that we use here, like WSR-88D, MicroARTS and AWIPS, PASS, T&A, etc, we have to assume that a national resource (like the OSF with the WSR-88D system) will do the required reprogramming efforts.

The Pacific Region is extremely fortunate here because we have very few home-grown programs in operation. One program we use now and will probably maintain past 2000 will be the small MAPSO PC-based surface observations program in Micronesia. It does not have a "year" problem since the only date/time groups used are DDHHMM where its DD= day date, HH= hour, and MM= minute; it does not use a year variable anywhere. The Pacific Tsunami Warning Center does have UNIX and C programs it runs operationally that will require a small reprogramming effort to correctly deal with the year 2000. This can be accomplished in-house and should be approximately a 1-2 staff month task.

In summary, there will be a small impact on Pacific Region in terms of new versions of commercial software to be purchased and those and "nationally" corrected programs to be loaded on computers, but only a small reprogramming effort will be required and no additional staff are needed.

## **NWSRFS**

### **Operational Y2K Impact - Medium Risk**

The National Weather Service River Forecast System (NWSRFS) is a suite of software that allows the NWS River Forecast Centers to produce the river guidance forecasts for the NWS Weather Forecast Offices and for other cooperating agencies. The suite includes software to decode data messages, store the decoded data in databases, process data into time series to be used by the hydrologic and hydraulic models, run the models, and to display the data and output of the model runs allowing forecaster interaction. The failure of any one of these pieces to be able to handle the year 2000 (and beyond) will prevent the forecasts from being produced.

## **Office of Systems Operations**

### **Operational Y2K Impact - Medium Risk**

AFOS: AFOS is the NWS' primary computer communication network for distribution of weather information. AFOS is presently an upgraded telecommunication and data processing system (System Z) that is used by the NWS to prepare and distribute warnings, forecasts, and weather-related data throughout the conterminous United States. The system is composed primarily of a Front End Processor (FEP) for synchronous and asynchronous communications and a Back End Processor (BEP) for data creation, data storage, and other AFOS functions. It is expected that AFOS will be replaced by AWIPS at some future date. It is unknown whether AFOS will be completely replaced by AWIPS by the year 2000.

Unless necessary (software/firmware) modifications or other possible solutions are analyzed and executed, the Front End Processor (FEP) for the AFOS system (Automation of Field Operations and Services) will be adversely affected by the year 2000 leap year software problems in several ways. These FEP problems will adversely affect the storage and forwarding of AFOS products such as Warnings and Forecasts. The FEP code or the FEP Operating System needs to be analyzed to make it year 2000 compliant. The stand-alone program DK0PDT takes care of any year problems in AFOS at the present time, but will not help the FEP on 2/29/2000.

SRWARN, the national warning program is a PC application which is used to create warnings which are then sent asynchronously to AFOS. If a warning is created on the warning PC on 2/29/2000, SRWARN inserts a date of 2/28/2000. The message header shows the warning date as 2/29. When it is sent to the AFOS FEP, the date is stamped as 3/1. Although tests in this area were limited, they indicate that SRWARN or the ABT also has a problem with 2/29/2000. ugh SRWARN is the only official NWS warning program although there may be unofficial applications in existence in the field.

Actions that will be required:

- o Examine and analyze the AFOS FEP firmware and FEP Operating System code.
- o Determine the proper correction method(s) or possible workarounds.



- o This might necessitate corrections/testing/distribution of corrected EPROMS or Operating System. This distribution would involve every AFOS WSFO/WSO/RFC.
- o WATCHDOG, SRWARN, and all stand-alone background applications used in the field or written by Technique Development Laboratory (TDL) programmers should be analyzed and corrections made, if necessary.
- o A message should be distributed to all authors of stand-alone background applications and PC applications that interface with AFOS (such as SRWARN and many others) to analyze these important programs to ensure their proper execution in the Y2K including the Y2K leap day. I believe that the TDL tracks these applications in a software library.
- o Analyze the message killing algorithm.
- o As a safeguard, examine BEP software to ensure there is no buried Y2K problem that is not easily observable.

Systems Operations Center (NWS Telecommunications Gateway): Year 2000 Impact  
Preliminary Conclusions

System Hardware

CISCO Routers

7000 and 7513 are compliant per CISCO documentation.

IBM 9672 Hosts

RB4 and R32 are compliant per IBM documentation.

Hardware Management Consoles and System Elements for IBM 9672 systems

Compliant per IBM documentation.

DASD

IBM RAMAC and EMC 4800 series compliant per system manufacturer documentation.

AMDAHL 4745

Compliant per AMDAHL documentation

\*\* Unable to set system time beyond year 2000 \*\*

IBM 3814 Matrix Switch

Compliant per IBM documentation.

IBM 3174 and 3274 console controllers

Compliant per IBM documentation.

Concurrent Computers 3210

FOS System

Year 2000 and leap year tested.

IWDS System

Year 2000 and leap year tested.

VEQR System

Year 2000 and leap year tested. CCB test and automatic time setting test still required.

#### Fax System

Year 2000 and leap year tested. Automatic time setting test still required.

#### BBN Packet Switch

Awaiting information from manufacturer.

#### System Software

VM/ESA compliant per IBM documentation.

VSE/ESA compliant per IBM documentation.

MVS testing in progress.

#### Application Software

Testing in progress

Upper Air Program: Without making the necessary software modifications, the main processor for upper air in the field, the Microcomputer Automatic Radio Theodolite (MicroART) system, will be adversely affected by the year 2000 software problem in a number of ways. MicroART is the current operational upper air data collection system, and generates upper air observations that are dialed into the Automation of Field Operations and Service (AFOS) system asynchronously.

The most serious Y2K implication is the fact that no upper air flights will be possible after the 1200 hours Universal Time Coordinated (UTC) flight on 31 Dec 1999. Because the MicroART software detects an invalid year of 100 (99+1), the operator cannot proceed past the flight pre-release program. In addition, the upper air archive software utility does not recognize the year 2000 which will preclude the data from being sent to the National Climatic Data Center (NCDC) for archival purposes. Preliminary analysis indicates there could also be a problem in incorrectly encoding the World Meteorological Organization (WMO) product headers on the RADAT and WMO coded messages.

Several actions have been taken and are underway to resolve the MicroART Y2K problems. These include:

- The complete analysis of the MicroART source code.
- The development of a "beta" software load that resolves the "pre-flight" and "in-flight" Y2K problems.
- The "Beta" testing of software is currently in progress at Sterling VA.
- Any possible Y2K firmware implications related to the upper air radiosonde instrumentation is being investigated with the manufacturers.

#### **National Centers for Environment Prediction Operational Y2K Impact - Moderate to High Risk**

Many of the computer systems at NCEP are mission critical. The need to recognize and

successfully address the potential impact of Y2K problems within those systems has fundamental and very broad implications for the entire National Weather Service.

There are essentially four areas of risk with regard to the ability of NCEP to meet its mission in the face of disruptions due to Y2K problems.

i) High-end computing -- The Cray systems

If the operation of these systems which NCEP utilizes to perform its basic analysis and modeling functions were disrupted, then NCEP would be unable to deliver numerical guidance to the NWS, to the private sector, or to meet international obligations. The C90 system will be replaced in operations by a new Class VIII system that will be delivered in mid-1998. The Class VIII system will be fully operational by March, 1999 -- and the contract under which it will be procured will require that the system be Y2K compliant. NCEP will port only Y2K compliant applications to that new system. The current Cray systems (2 J916's in addition to the C90) will have Y2K compliant operating systems installed in late 1997. All local applications running on these systems will either be ported to the Class VIII system or will be locally tested and modified (as is most appropriate) to be compliant well in advance of 2000.

This is an area of extreme criticality but relatively low risk.

ii) Operational Workstations

NCEP employs workstations from many vendors to display, create, and disseminate forecast products, principally those from the service centers. These are the manual guidance and forecast products that support the warning and short-term forecast programs of the NWS. This is another area that is critical and it is also one of moderate to high risk.

NCEP has a number of old workstations that cannot support Y2K compliant versions of the operating systems that will be available from the vendors of those systems. It is our intent to procure approximately 35 such workstations at an estimated cost of \$420,000 in FY98 and complete the work of transferring operations to these systems by early in 1999. If the FY98 budget cannot support this, then the risk will increase significantly.

Another dimension of the risk in this area concerns the number of such workstations (about 250) in use at NCEP as well as the fact that this includes equipment from several manufacturers. In most cases, Y2K compliant versions of the operating systems for these platforms are not yet available. They are promised generally by early 1998. If this expectation is not met and if the delivery of compliant vendor software slips significantly, then our ability to address the problem could become problematic -- depending on the length of the delays in those deliveries.

Generally speaking, NCEP expects to be able to meet this problem by (a) upgrading commercial software to be Y2K compliant as soon as it becomes available, replacing systems that cannot accommodate such upgrades; (b) modifying all local workstation applications to be Y2K compliant not later than mid-1999; and (c) testing workstation systems beginning in 1998 to

identify, isolate, and correct specific areas of non-compliance.

iii) External Communications

The most critical communications pathways between NCEP and others today involve communications with or through OSO. In the future, AWIPS communications to and from NCEP will become increasingly important too. This is an area of extreme criticality in that if NCEP is unable either to receive the data which drive its numerical processes or unable to deliver its products to those who rely upon them, the basic mission of the NWS is jeopardized.

The risk in this area is low due to the following factors. Our communications today rely upon industry standards, the number of systems involved is relatively modest, and the amount of locally developed code employed in this activity is small.

iv) Internal Communications

This is also critical to the ability of the NCEP Centers to perform their roles, though slightly less critical than the above. By the year 2000 NCEP should be able to function, though in a degraded backup mode, without the capability for intra-center communications.

As in iii just above, the risk in this area is low and for the same reasons. Internal NCEP communications rely upon industry standards, the number of systems involved is modest, and the amount of locally developed code employed in this activity is small.